We claim:

1. A damascene method, comprising:

(a) providing a substrate;

(b) depositing a composite barrier/etch stop layer comprised of a lower silicon carbide (SiC) layer and an upper oxygen doped SiC layer on said substrate;

(c) forming a first dielectric layer on said oxygen doped SiC layer;

(d) forming an opening with sidewalls and a bottom in said first dielectric layer;

(e) removing said composite barrier/etch stop layer that is exposed at the bottom of said opening;

(f) depositing a conformal diffusion barrier layer on the sidewalls and bottom of said opening; and

(g) depositing a metal layer on the conformal diffusion barrier layer that fills said opening.

2. The method of claim **1** wherein the substrate is comprised of a conductive layer with a top surface and said opening exposes a portion of the top surface of the conductive layer.

3. The method of claim **2** wherein the conductive layer and the metal layer are comprised of copper.

4. The method of claim **1** wherein the diffusion barrier layer is comprised of Ta, TaN, TaSiN, Ti, TiN, W, or WN and has a thickness in the range of about 50 to 300 Angstroms.

5. The method of claim **1** wherein said first dielectric layer is comprised of Black Diamond™, CORAL™, fluorine doped SiO_2, hydrogen silsesquioxane (HSQ), methyl silsesquioxane (MSQ), a fluorinated polyimide, a polyarylether, or benzocyclobutene.

6. The method of claim **1** wherein the lower SiC layer has a thickness from about 50 to 150 Angstroms and the oxygen doped SiC layer has a thickness between about 50 and 1000 Angstroms.

7. The method of claim **1** wherein the oxygen doped SiC layer is deposited by a PECVD process that includes an oxygen flow rate from about 20 to 200 standard cubic centimeters per minute (sccm), a helium flow rate of about 700 to 1000 sccm, a trimethylsilane or tetramethylsilane flow rate of about 280 to 350 sccm, a substrate temperature of from 300°C to 400°C, a chamber pressure of 2 to 8 Torr, and a RF power of about 100 to 1000 Watts that is generated with a RF frequency of 13.56 MHz.

8. The method of claim **7** wherein the substrate temperature is 350°C, the RF power is 460 Watts, chamber pressure is 3.5 Torr, the O_2 flow rate is about 30 sccm, the He flow rate is about 800 sccm, and the trimethylsilane flow rate is about 320 sccm to give an oxygen doped SiC deposition rate in the range of 850 to 950 Angstroms per minute.

9. The method of claim **7** wherein the oxygen doped SiC layer has a silicon content from about 25 to 35 atomic weight %, a carbon content of about 17 to 25 atomic wt. %, an oxygen content of about 5 to 15 atomic wt. %, and a hydrogen content from about 20 to 40 atomic wt. %.

10. The method of claim **7** wherein the oxygen doped SiC layer has a good etch selectivity to Black Diamond™ or CORAL™ of about 1:6 to 1:10 in a plasma etch comprised of C_4F_8 and Ar gases.

11. The method of claim **1** further comprised of treating said oxygen doped SiC layer with a N_2, He, or Ar plasma before said first dielectric layer is formed.

12. The method of claim **1** further comprised of a chemical mechanical polish process to planarize said metal layer.

13. A dual damascene method, comprising:

(a) providing a substrate with a conductive layer formed within a first dielectric layer, said conductive layer has an exposed top surface that is coplanar with the top surface of said substrate;

(b) depositing a barrier/etch stop layer comprised of a lower silicon carbide (SiC) layer and an upper first oxygen doped SiC layer on said substrate;

(c) forming a second dielectric layer on said first oxygen doped SiC layer;

(d) depositing a second oxygen doped SiC etch stop layer on said second dielectric layer;

(e) forming a third dielectric layer on said second oxygen doped SiC layer;

(f) forming an opening comprised of a via that exposes said conductive layer and a trench aligned above said via wherein the via has sidewalls and a bottom and extends through said second and third dielectric layers, second oxygen doped SiC layer, and through the composite barrier/etch stop layer and wherein the trench has sidewalls and a bottom and is formed in the third dielectric layer; and

(g) depositing a conformal diffusion barrier layer on the sidewalls and bottom of said trench and via and depositing a metal layer on said conformal diffusion barrier layer that fills said trench and via.

14. The method of claim **13** further comprised of forming a cap layer on the third dielectric layer and wherein the trench is aligned above a via that exposes the conductive layer and said trench is formed in the cap layer and third dielectric layer.

15. The method of claim **13** wherein said conductive layer and metal layer are comprised of copper.

16. The method of claim **13** wherein the diffusion barrier layer is comprised of Ta, TaN, TaSiN, Ti, TiN, W, or WN and has a thickness in the range of about 50 to 300 Angstroms.

17. The method of claim **13** wherein said first, second, and third dielectric layers are a low k dielectric material comprised of Black Diamond™, CORAL™, fluorine doped SiO_2, hydrogen silsesquioxane (HSQ), methyl silsesquioxane (MSQ),a fluorinated polyimide, a polyarylether, or benzocyclobutene.

18. The method of claim **13** wherein said second and third dielectric layers have a thickness in the range of about 1000 to 10000 Angstroms.

19. The method of claim **14** wherein the SiC in said barrier/etch stop layer has a thickness from about 50 to 150 Angstroms and the first and second oxygen doped SiC layers have a thickness between about 50 and 1000 Angstroms.

20. The method of claim **13** wherein said first and second oxygen doped SiC layers are deposited by a PECVD process that includes an oxygen flow rate from about 20 to 200 sccm, a helium flow rate of about 700 to 1000 sccm, a trimethylsilane or

tetramethylsilane flow rate of about 280 to 350 sccm, a substrate temperature of from 300°C to 400°C, a chamber pressure of 2 to 8 Torr, and a RF power of about 100 to 1000 Watts that is generated with a RF frequency of 13.56 MHz.

21. The method of claim **20** wherein the substrate temperature is 350°C, the RF power is 460 Watts, chamber pressure is 3.5 torr, the O_2 flow rate is 30 sccm, the He flow rate is 800 sccm, and the trimethylsilane flow rate is 320 sccm to give an oxygen doped SiC deposition rate in the range of 850 to 950 Angstroms per minute.

22. The method of claim **20** wherein the first and second oxygen doped SiC layers have an etch selectivity to Black Diamond™ or CORAL™ of about 1:6 to 1:10 in a plasma etch comprised of C_4F_8 and Ar gases.

23. The method of claim **21** wherein the composition of the first and second oxygen doped SiC layers has a silicon content from about 25 to 35 atomic weight %, a carbon content of about 17 to 25 atomic wt. %, an oxygen content of about 5 to 15 atomic wt. %, and a hydrogen content from about 20 to 40 atomic wt. %.

24. The method of claim **13** further comprised of treating the first oxygen doped SiC layer with a N_2, Ar, or He plasma prior to depositing the second dielectric layer and treating the second oxygen doped SiC layer with a N_2, Ar, or He plasma prior to depositing the third dielectric layer.

25. A dual damascene structure comprising:

(a) a semiconductor substrate;

(b) a silicon carbide barrier layer formed on said substrate;

(c) a first oxygen doped SiC etch stop layer formed on said silicon carbide layer;

(d) a first dielectric layer formed on said first oxygen doped SiC layer;

(e) a second oxygen doped SiC etch stop layer formed on said first dielectric layer;

(f) a second dielectric layer formed on said second oxygen doped SiC layer;

(g) an opening comprised of a via with sidewalls and a bottom that exposes a portion of said substrate and a trench aligned above said via, said trench has sidewalls and a bottom and is formed in said second dielectric layer; and

(h) a conformal diffusion barrier on the sidewalls and bottoms of said via and trench and a metal layer on said diffusion barrier layer that fills said opening and is coplanar with the second dielectric layer.

26. The dual damascene structure of claim **25** wherein the substrate is comprised of a conductive layer with an exposed top surface and the bottom of the via exposes a portion of the top surface of said conductive layer.

27. The dual damascene structure of claim **26** wherein said conductive layer and metal layers are comprised of copper.

28. The dual damascene structure of claim **25** wherein the metal layer has a width that is less than about 0.25 microns.

29. The dual damascene structure of claim **25** wherein the diffusion barrier layer is comprised of Ta, TaN, TaSiN, Ti, TiN, W, or WN and have a thickness in the range of about 50 to 300 Angstroms.

30. The dual damascene structure of claim **25** wherein said first and second dielectric layers are comprised of Black Diamond™, CORAL™, fluorine doped SiO_2, hydrogen silsesquioxane (HSQ), methyl silsesquioxane (MSQ), a fluorinated polyimide, a polyarylether, or benzocyclobutene.

31. The dual damascene structure of claim **25** wherein said first and second dielectric layers have a thickness in the range of about 1000 to 10000 Angstroms.

32. The dual damascene structure of claim **25** wherein the SiC barrier layer has a thickness in the range of about 50 to 150 Angstroms.

33. The dual damascene structure of claim **25** wherein said first and second oxygen doped SiC layers have a thickness between about 50 and 1000 Angstroms.

34. The dual damascene structure of claim **25** wherein the first and second oxygen doped SiC layers have a silicon content from about 25 to 35 atomic weight %, a carbon content of about 17 to 25 atomic wt. %, an oxygen content of about 5 to 15 atomic wt. %, and a hydrogen content from about 20 to 40 atomic wt. %.

35. The dual damascene structure of claim **25** wherein the dielectric constant of said first and second oxygen doped SiC layers is between about 3.7 and 4.3.

36. The dual damascene structure of claim **25** wherein the breakdown field of said first and second oxygen doped SiC layers is greater than about 4 milliVolts/cm.

37. The damascene structure of claim **25** which is repeated a plurality of times to form a stack of metal layers on said substrate.